

Chapter 4

Monitoring and Evaluation



Cover photo: Controlled burn on Mark Twain National Forest, USDA Forest Service

Mark Twain National Forest photo on file

Chapter 4

Monitoring and Evaluation

Introduction

Monitoring and evaluation are separate, sequential activities required by National Forest Management Act (NFMA) regulations. Monitoring involves collecting data by observation or measurement. Evaluation involves analyzing and interpreting monitoring data. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives, and outcomes of the Forest Plan have been met. Monitoring and evaluation form the basis for continuous improvement of the plan, and provide the feedback mechanism for adaptive management. (Fig. 4-1). The results of monitoring and evaluation are used to identify when changes are needed to either the Forest Plan itself or the way it is implemented, and helps ensure the Forest Plan is kept up-to-date and responsive to changing conditions and issues.

The plan monitoring program sets out the plan monitoring questions and associated indicators. Monitoring questions and associated indicators are designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives.

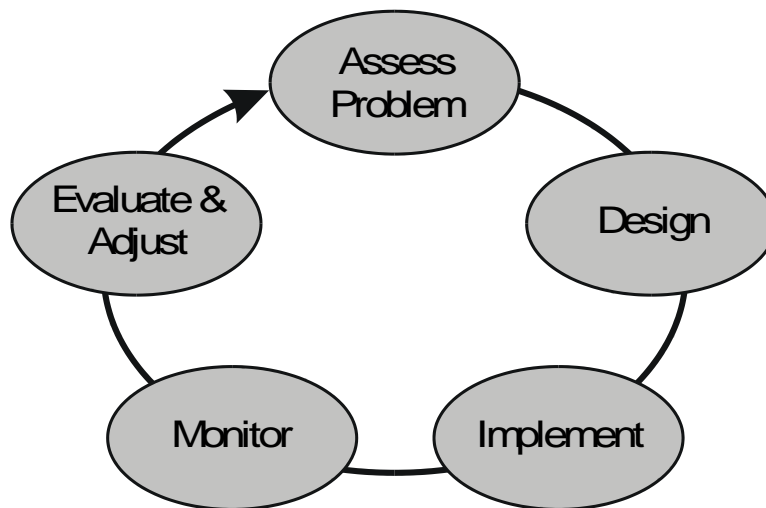


Figure 4-1. Evaluation and monitoring provide the feedback mechanism for adaptive forest management.

Monitoring Requirements

The 2012 Planning Rule (36 CFR 219.12) requires the monitoring program to address the following eight resource items with at least one monitoring question and associated indicator(s):

- The status of select watershed conditions.
- The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
- The status of focal species to assess ecological conditions.
- The status of a select set of ecological conditions that contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
- Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
- Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
- The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 USA 1604(g)(3)c)).

Evaluation Requirements

The Forest Supervisor is responsible for conducting a biennial evaluation of information gathered through the plan monitoring program and any relevant information from broader-scale monitoring. Each biennial evaluation should build on the biennial evaluations that precede it. A written report summarizing the monitoring reports and evaluation will be produced and made available to the public (36 CFR 219.12 (d)(1)). The report must indicate whether a change to the plan, management activities, the monitoring program, or a new assessment may be warranted based on the new information. The report is not a decision document and is not subject to the objection process provisions of 36 CFR 219.12, Subpart B.

Monitoring Matrix

Monitoring and evaluation items are organized in Table 4-1. Monitoring items are organized by required Planning Rule topic areas, and include the following components:

- **Monitoring Questions** - Specific monitoring questions are developed to provide information essential to measuring accomplishment and effectiveness.
- **Monitoring Indicators** - A monitoring indicator is a quantitative or qualitative parameter that is measured to answer monitoring questions. One or more indicators can be associated with each question.

Table 1. Monitoring Matrix

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
Status of select watershed conditions (36 CFR 219.12(a)(5)(i))	1	To what extent is Forest management affecting water quality?	BMP Implementation and Effectiveness Monitoring (use National BMP protocols, evaluate % implemented; % effective)
	2	To what extent is Forest management affecting priority watershed condition?	Watershed Condition Class Score (25 indicators)
The status of select ecological conditions including key characteristics of the terrestrial and aquatic ecosystems (36 CFR 219.12(a)(5)(ii))	3	Are vegetation management practices moving conditions towards desired natural community type structural characteristics?	Table A-1 Parameters for NCs (% canopy, basal area, understory, shrub layer, ground cover)
	4	Are restoration activities increasing plant species richness and native plant cover for woodlands, glades and forests?	Change in native species richness and cover
	5	To what extent are prescribed fires used to mimic natural processes, maintain/improve vegetative conditions and/or restore natural processes and functions to ecosystems?	Acres of prescribed burn completed in Management Prescriptions 1.1, 1.2, 8.1 and 5.1
	6	To what extent are hazardous fuels being treated in the Wildland - Urban Interface (WUI) and/or in high risk areas?	Acres of prescribed burn and mechanical work completed in WUI Acres of prescribed burn and mechanical work completed in High Risk Areas designated in LRMP FEIS Appendix G - Fire Risk Assessment
	7	To what extent are fuel treatments affecting the successful suppression of wildfires?	Number of wildfires burned into fuel treatment units AND number of those with fire suppression/behavior impacts; OR percent of wildfires which burn into fuel treatment units where suppression or fire behavior changed due to fuel treatment
	8	Are lentic ecosystems providing habitat for fish and other aquatic species?	Number of lakes stocked Number of vernal pools constructed
	9	Are lotic ecosystems providing habitat for fish and other aquatic ecosystems?	Number of stream miles enhanced (AOP barriers removed, streams cleaned-up, large woody debris projects, etc)

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
The status of focal species to assess the ecological conditions required under 219.9 (36 CFR 219.12(a)(5)(iii))	10	To what extent is Forest management contributing to the maintenance and establishment of shortleaf pine and pine-oak woodlands as described in Appendix A?	Abundance of Eastern wood-pewee and Pine warbler in CFLR project area Nest success for Eastern wood-pewee and Pine warbler in CFLR project area
The status of select set of the ecological conditions required under 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern (36 CFR 219.12(a)(5)(iv))	11	To what extent is Forest management contributing to the conservation of threatened, endangered, and sensitive species and moving toward objectives for their habitat conditions? (NOTE: This question will be adjusted to include species of conservation concern when that list is determined by the Regional Forester)	Acres of key successional habitats provided (open lands, regeneration, etc. Specialized habitats (caves, fens, seeps, springs, cliffs, rock outcrops, wetlands, etc) being protected, maintained and restored. Summer roosting habitats for bats (snags) Bat caves gated
The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives. (36 CFR 219.12(a)(5)(v))	12	What is the status and trend of visitor use, visitor satisfaction, and progress toward meeting recreation objectives in the plan?	Annual visitation estimates by type of visit, day use, developed, general forest area Description of visit-- demographics, visit descriptions, activities Economic information--spending, substitute behavior, etc. Visitor Satisfaction
	13	To what extent do Forest recreation facilities and opportunities meet accessibility, health, safety, and maintenance requirements and achieve resource and social objectives?	Water quality at swimming beaches Facility inspections for compliance with critical and other standards from INFRA Water quality of drinking water
	14	To what extent are management activities meeting Recreation Opportunity Spectrum objectives?	Projects that are consistent with ROS objectives
	15	How are management activities affecting unauthorized OHV use?	Comparison of citations issued, documentation of resource damage, and public complaints to areas of management activities

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area. (36 CFR 219.12(a)(5)(vi))	16	How is the occurrence of mortality across the plan area changing on an annual basis?	Acres of mortality
Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. (36 CFR 219.12(a)(5)(vii))	17	How close are projected outputs and services to actual?	Timber volume sold, acres harvested, product mix
	18	What progress has been made towards meeting objectives in the plan?	Quantitative objectives from Chapter 1 of Forest Plan
The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (NFMA -- 16 U.S.C. 1604 (g) (3) C)) (36 CFR 219.12(a)(5)(viii))	19	Are the effects of forest management, including prescriptions, resulting in significant changes to productivity of the land?	Summary of results of monitoring using the National Soils protocols.